



# National Environmental Public Health Tracking Conference

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## Closing the Gap with Data and Tools from Partners

Timothy Miller  
Chief Office of Water Quality  
U.S. Geological Survey  
March 25, 2004

# Outline

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- **Brief Description of USGS.**
- **Some example USGS activities that exhibit potential for collaboration.**
- **Some USGS resources you may find useful.**

# USGS Mission

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**To provide reliable scientific information to:**

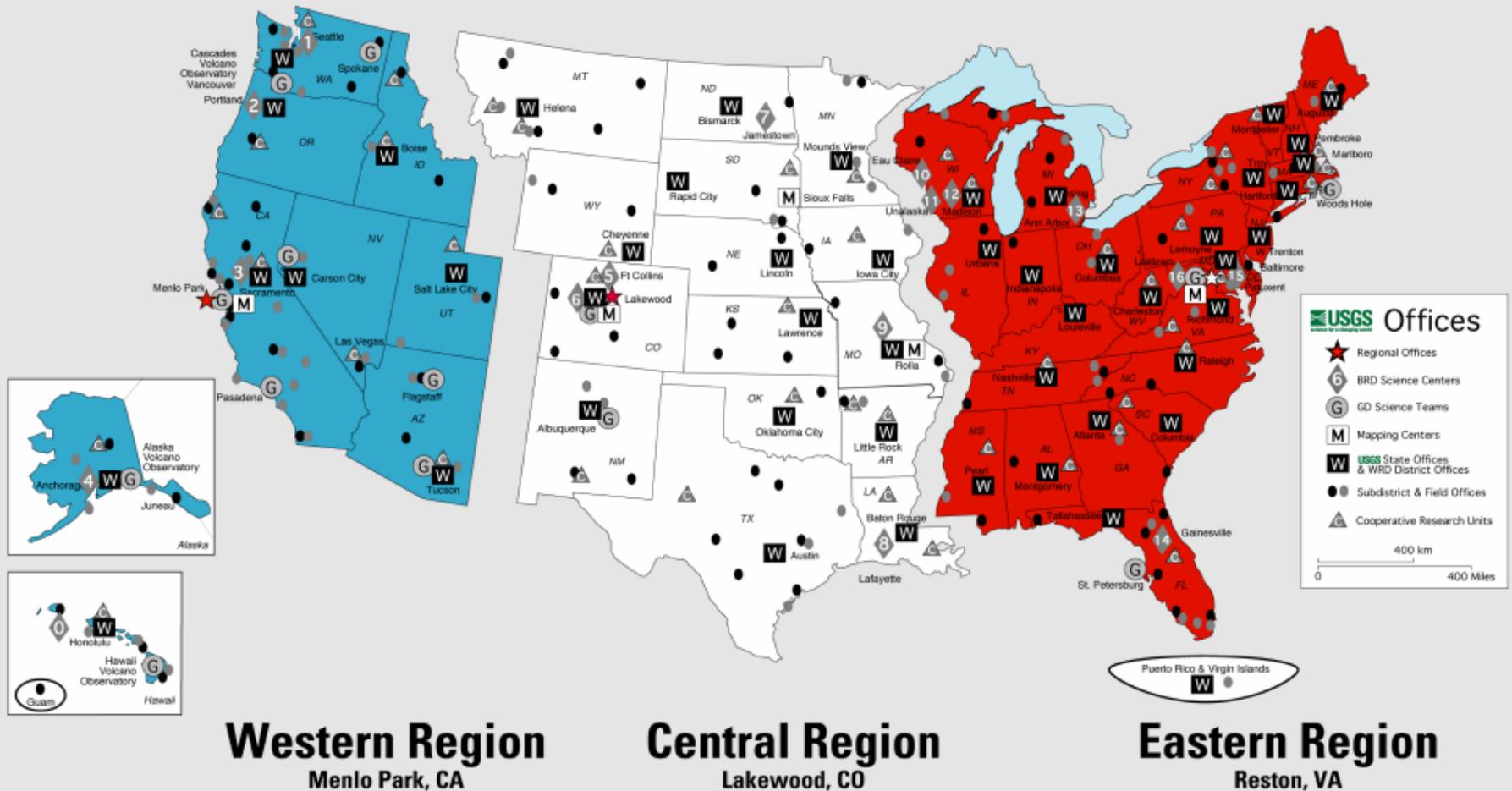
- describe and understand the Earth;
- minimize loss of life and property from natural disasters;
- manage water, biological, energy, and mineral resources; and
- enhance and protect our quality of life.

# USGS:

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- **Has 10,000 employees located in offices in every state.**
- **Conducts interdisciplinary scientific monitoring, assessment and research.**
- **Primary scientific disciplines are biology, geography, geology and hydrology**

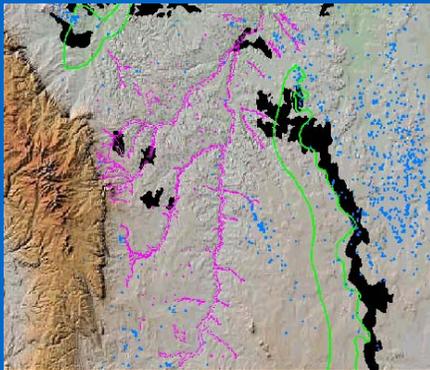
# U.S. Geological Survey Regions and Location of Major Offices





# USGS – Capabilities

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# USGS – Capabilities

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- **Nationally distributed, multidisciplinary workforce;**
- **Operate an extensive monitoring infrastructure;**
- **Develop, design, and maintain long-term national and international databases; and**
- **Conduct short & long term, broad-scale, interdisciplinary studies and research**

# Why we are here

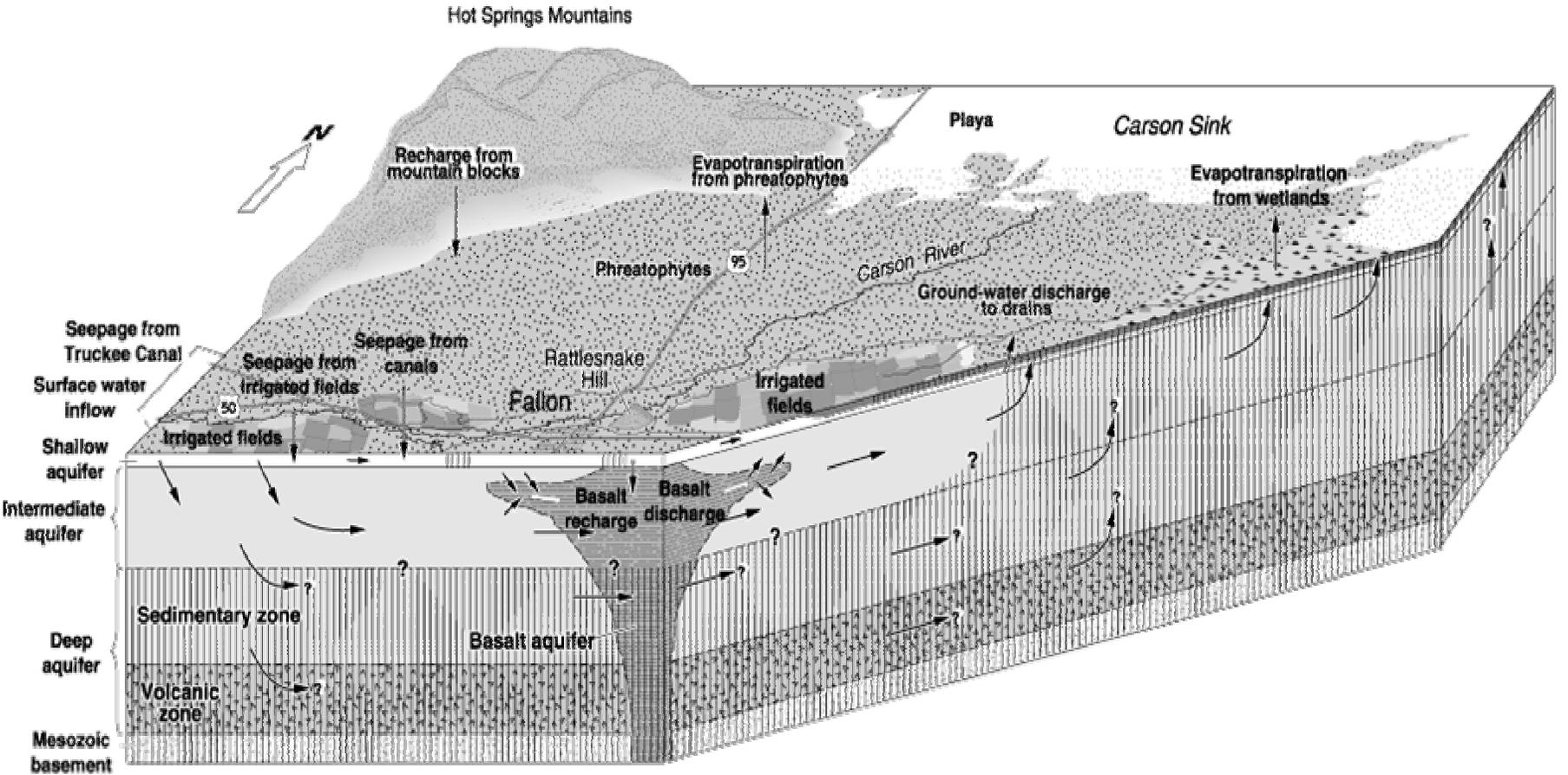
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- **USGS wants you to know what earth/natural resource science can provide,**
- **USGS needs to understand your needs and issues,**
- **Develop a common understanding of how and when to collaborate to help solve problems facing society.**



# **USGS Ground-Water Investigation Related to the Leukemia Cluster in the Fallon Area of Churchill County, Nevada**

Ralph Seiler  
U.S. Geological Survey  
Carson City, Nevada  
May 2002



Not to scale

# Objectives of USGS Investigation

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1. Characterize current quality of all drinking water sources in the Fallon area.
2. Determine if there have been changes in water quality over the last decade.
3. Evaluate if water consumed by case families differs from water consumed by the community as a whole.

# What analyses were included?

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Each sample  
required 35 bottles

- Major Anions and Cations
- Trace Elements, filtered and unfiltered
- Nutrients and DOC
- Volatile Organics
- Pesticides
- Alpha, Beta, Gamma Radioactivity
- Uranium isotopes
- Stable isotopes of water
- Radon

# How did we choose sites?

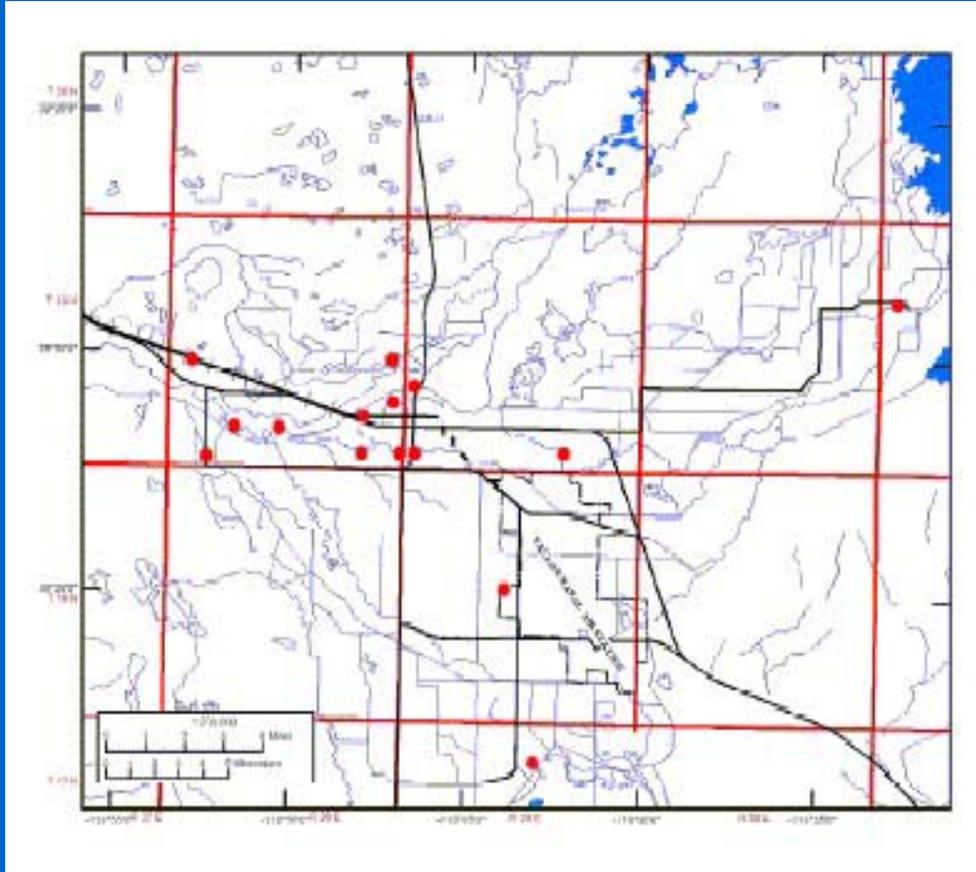
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**We wanted wells:**

- 1. Used as public supply**
- 2. Near the pipeline**
- 3. Throughout the valley**
- 4. In all the aquifers**
- 5. Where case families live or had lived**

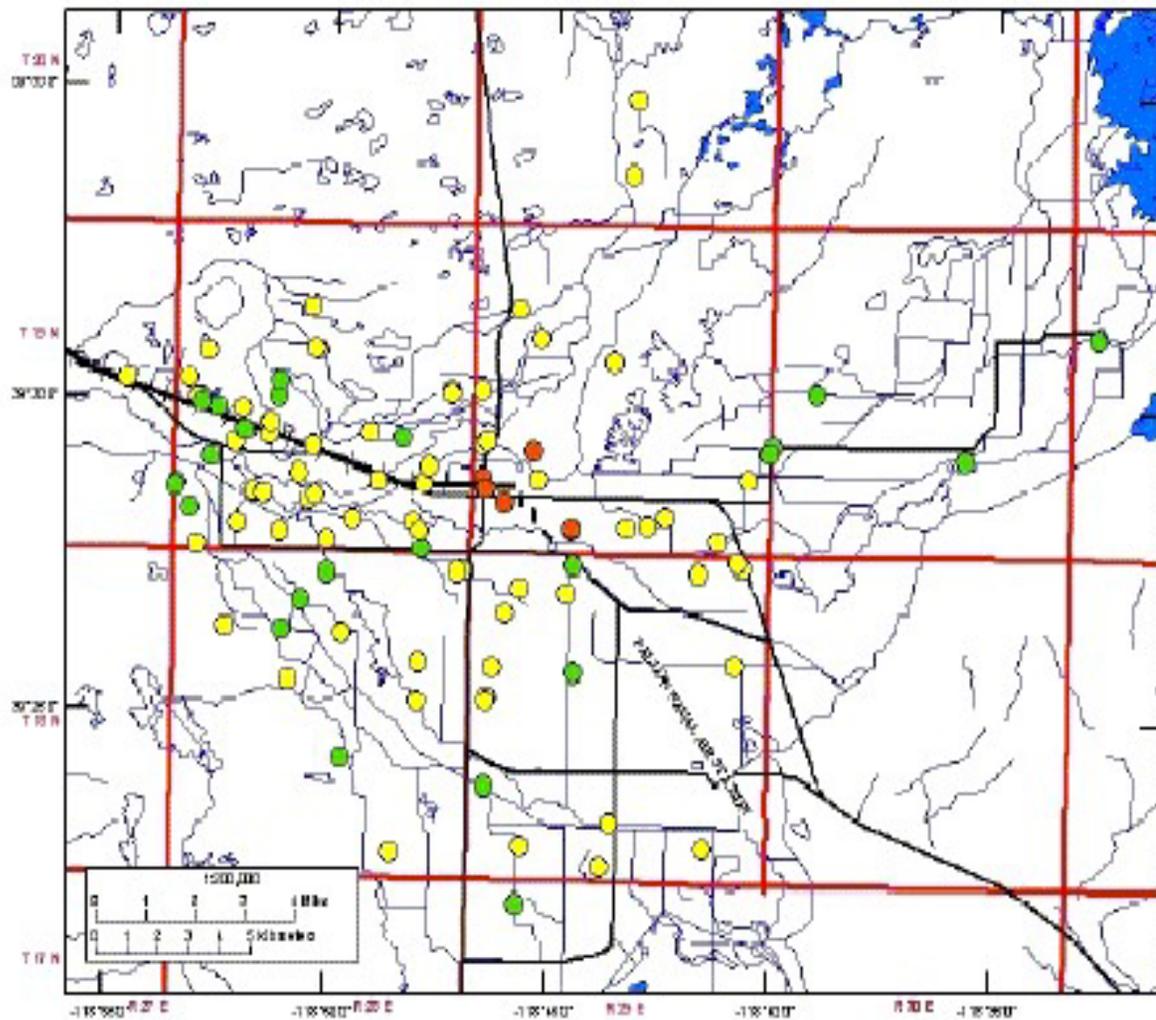
# Case Family Locations

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**Nevada State Health Division provided a map showing approximate locations of case-family residences.**

# Location of Sampling Sites

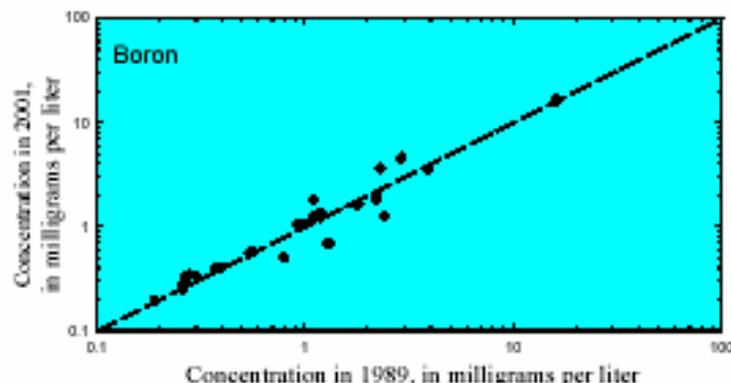
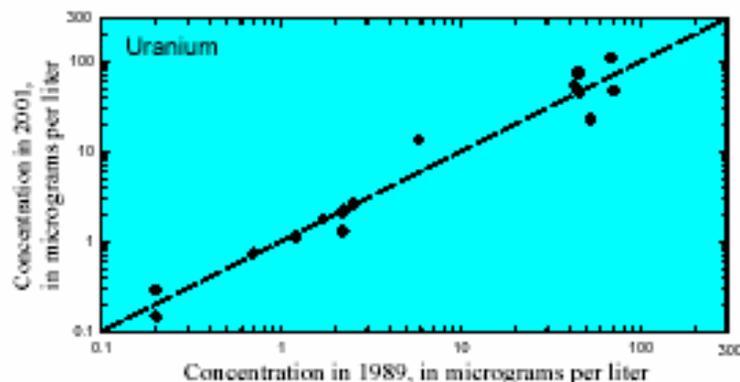
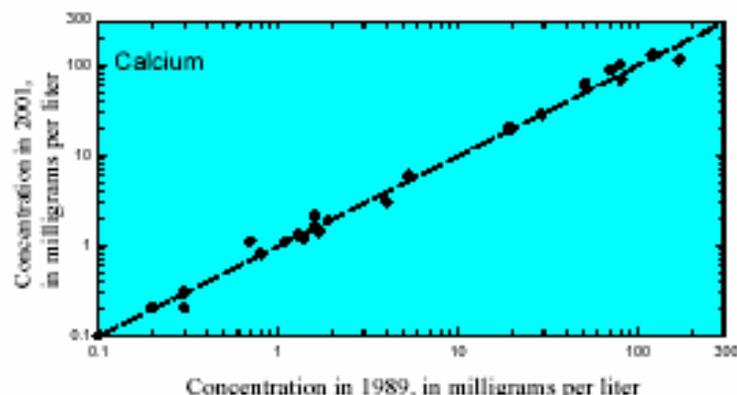


- Sallow Aquifer
- Intermediate Aquifer
- Basalt Aquifer

# Changes between 1989 and 2001

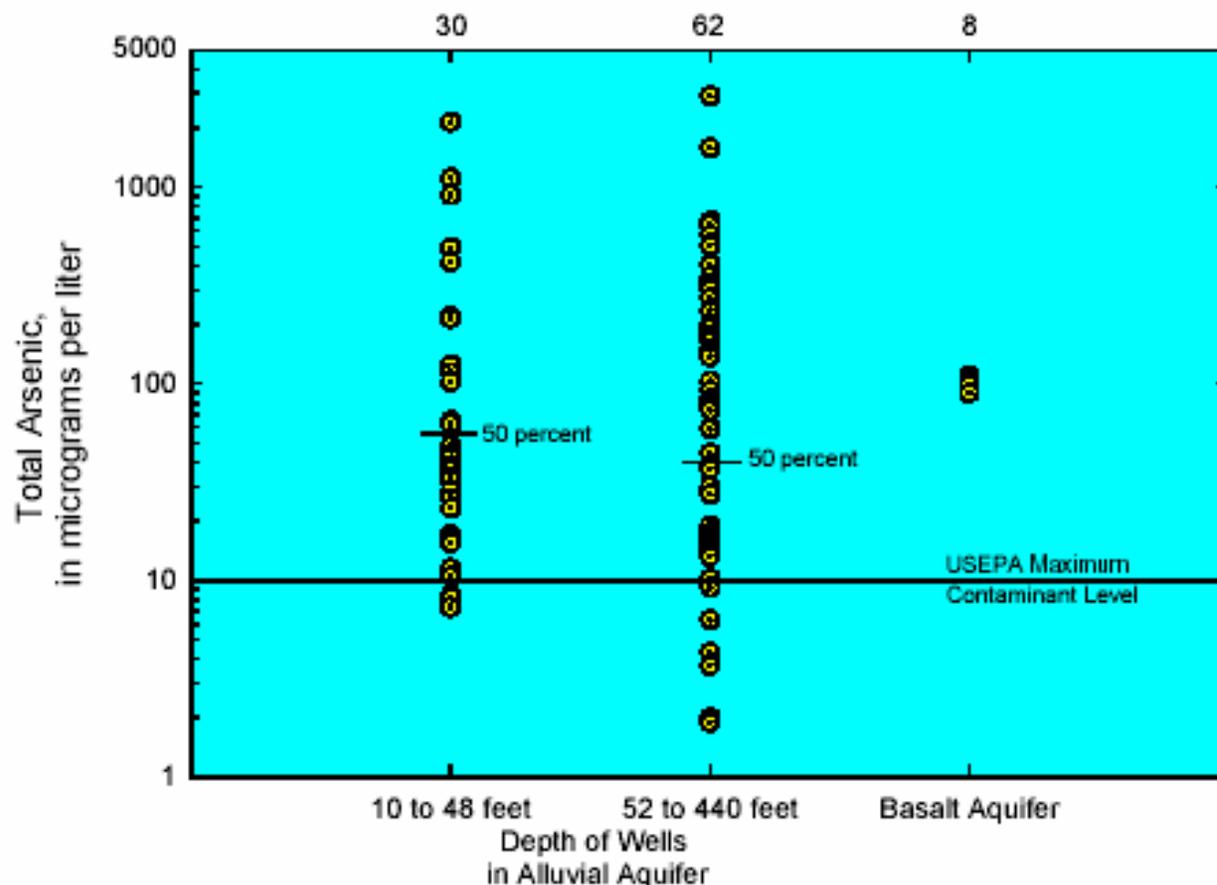
29 domestic and public-supply wells sampled in both 1989 and 2001.

Samples in close proximity to the dashed line indicate that samples were similar for both time periods.



# Arsenic

Number of Analyses

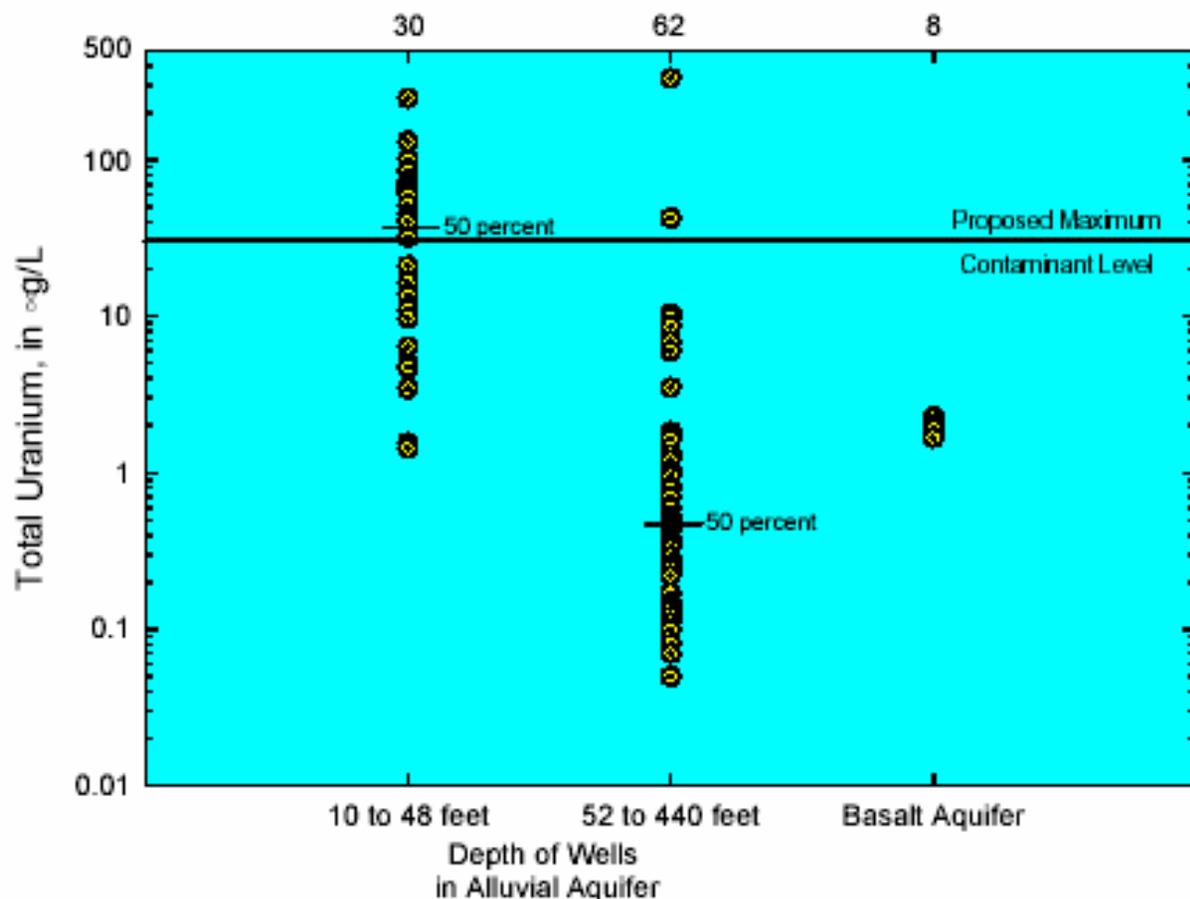


89 percent of samples exceed current MCL

Plot showing that most wells in all aquifers commonly exceed the US EPA Maximum Contaminant Level (MCL) for Arsenic.

# Uranium

Number of Analyses

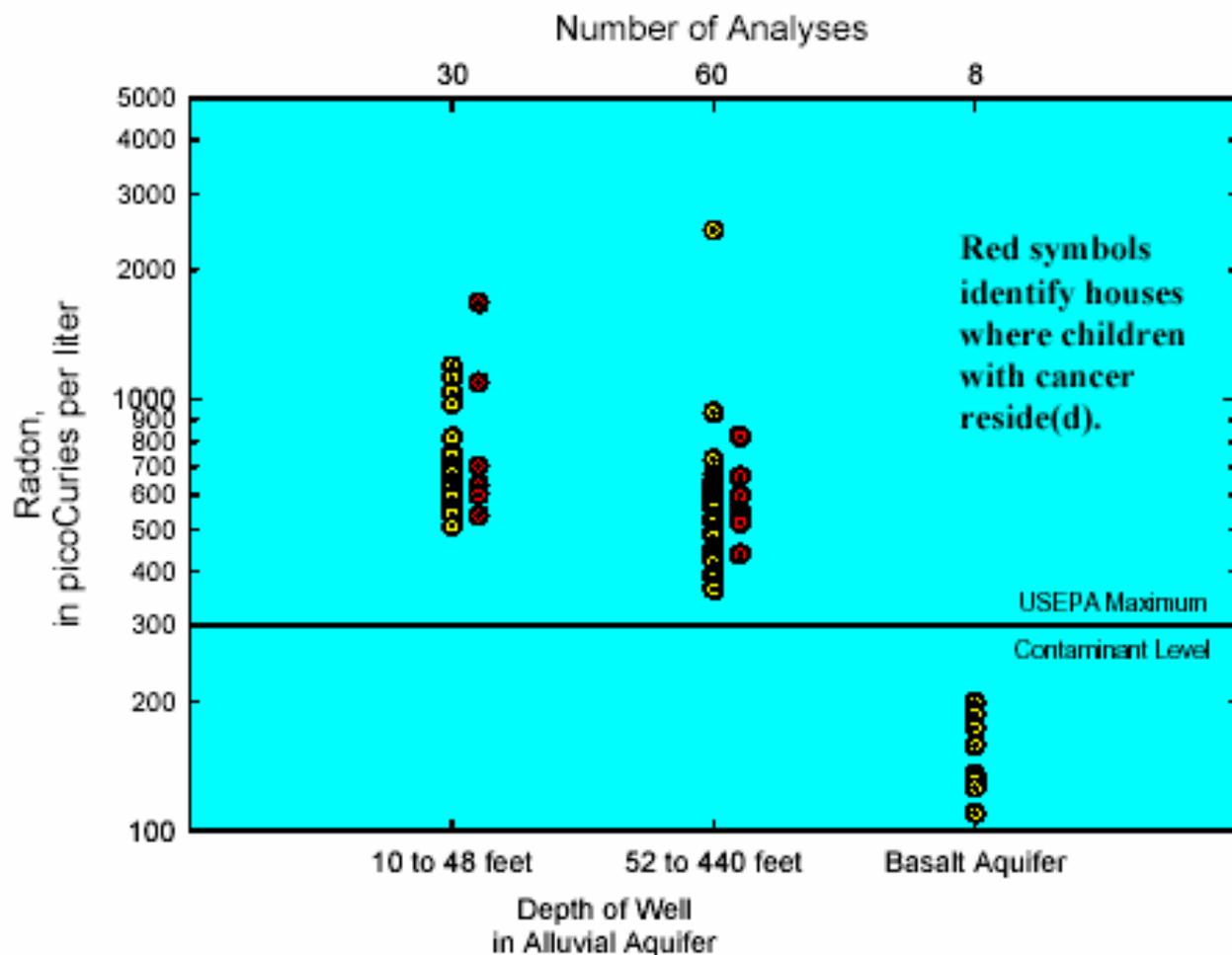


18 percent of samples exceed proposed MCL.

Almost all are in the shallow alluvial aquifer.

Plot showing concentrations of Uranium that demonstrates wells greater than 50 feet deep seldom exceed the proposed EPA Maximum Contaminant Level for Uranium.

# Radon



Plot showing radon concentrations in all of the alluvial aquifer water wells exceed the drinking water standards. It also shows the case families are exposed to Radon at the same levels as the community.

# VOCs and Pesticides

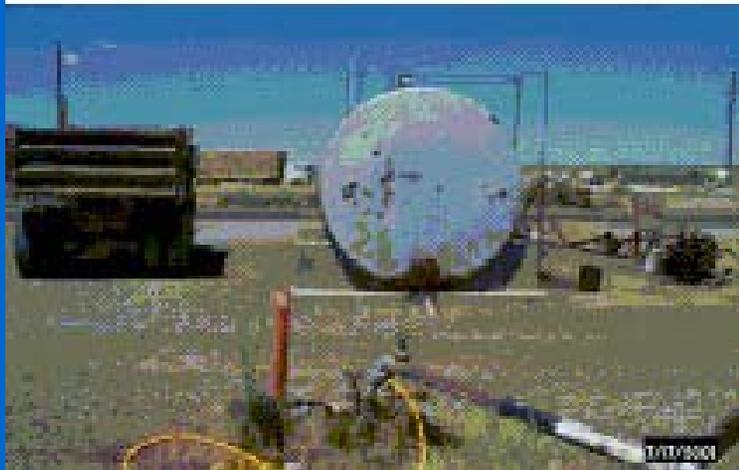
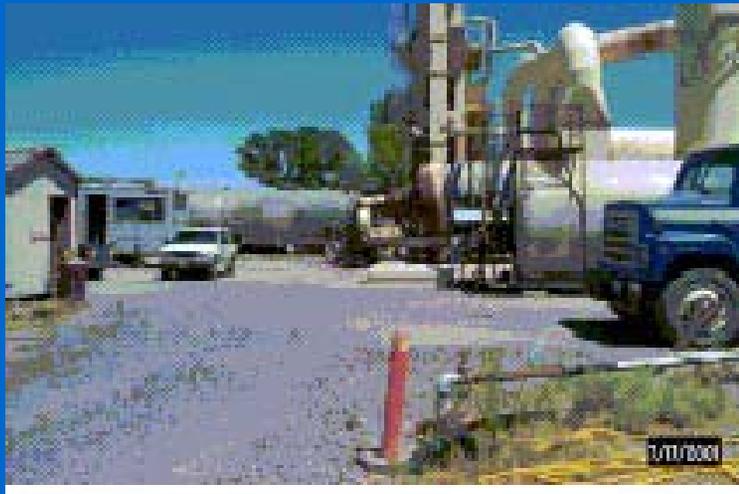
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- Few samples showed the presence of volatile organic compounds and pesticides.
- Benzene was never detected.
- TCE was detected once (0.05 ppb).
- Traces of chloroform (0.01 to 0.18 ppb) were found in seven domestic wells (1 case family).
- Traces of atrazine (0.01 ppb or less) were found in five wells (1 case family).
- Traces of simazine (0.05 ppb or less) were found in nine wells (1 case family).

# Fuels

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- Eleven wells are within 1000 feet of the pipeline.
- Depth of the wells ranged from 35 to 180 feet.
- Four of the wells are at former residences of case families.
- Fuel indicators (xylene, ethyl-benzene, PAHs) were found only at an industrial site.

# Conclusions

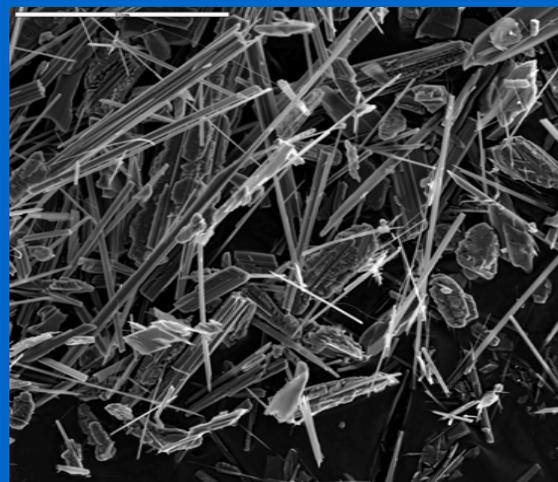
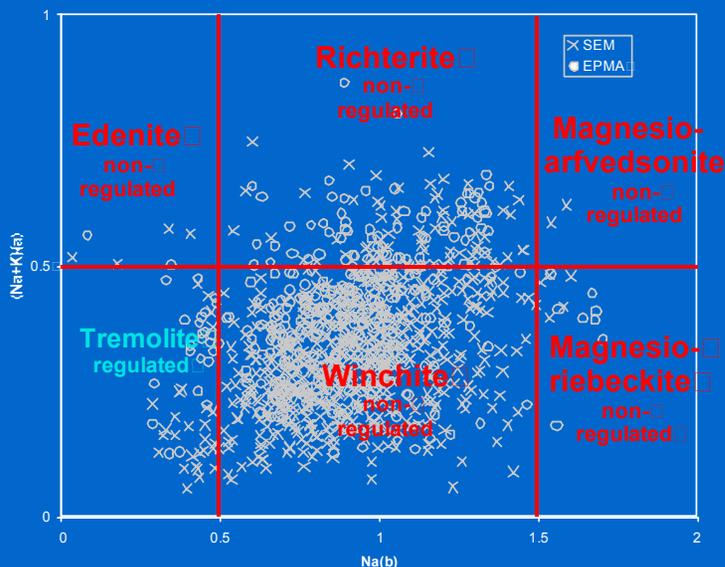
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- Quality of water in aquifers hasn't changed since 1989.
- Arsenic, uranium, and radon in ground water commonly exceed drinking water standards.
- There is no “Aha, we found it!” Nothing we have now points to a cause for the cancer cluster:
  - Case-family wells near the pipeline do not contain fuels or solvents.
  - Case families are exposed to the same concentrations of arsenic, uranium and radon as the rest of the community.

# Current USGS Asbestos Research

- Mineralogical characterization of fibrous amphiboles at Libby, MT
  - In cooperation with EPA, ATSDR, Public Health Service
  - Project scientists have found that Libby amphiboles show a wide range of compositions and shapes, many of which do not fit the standard regulatory definitions of asbestos. Toxicological studies in collaboration with public health scientists will help determine if the “non-asbestiform” particles contribute to toxicity.

## Libby amphibole compositions



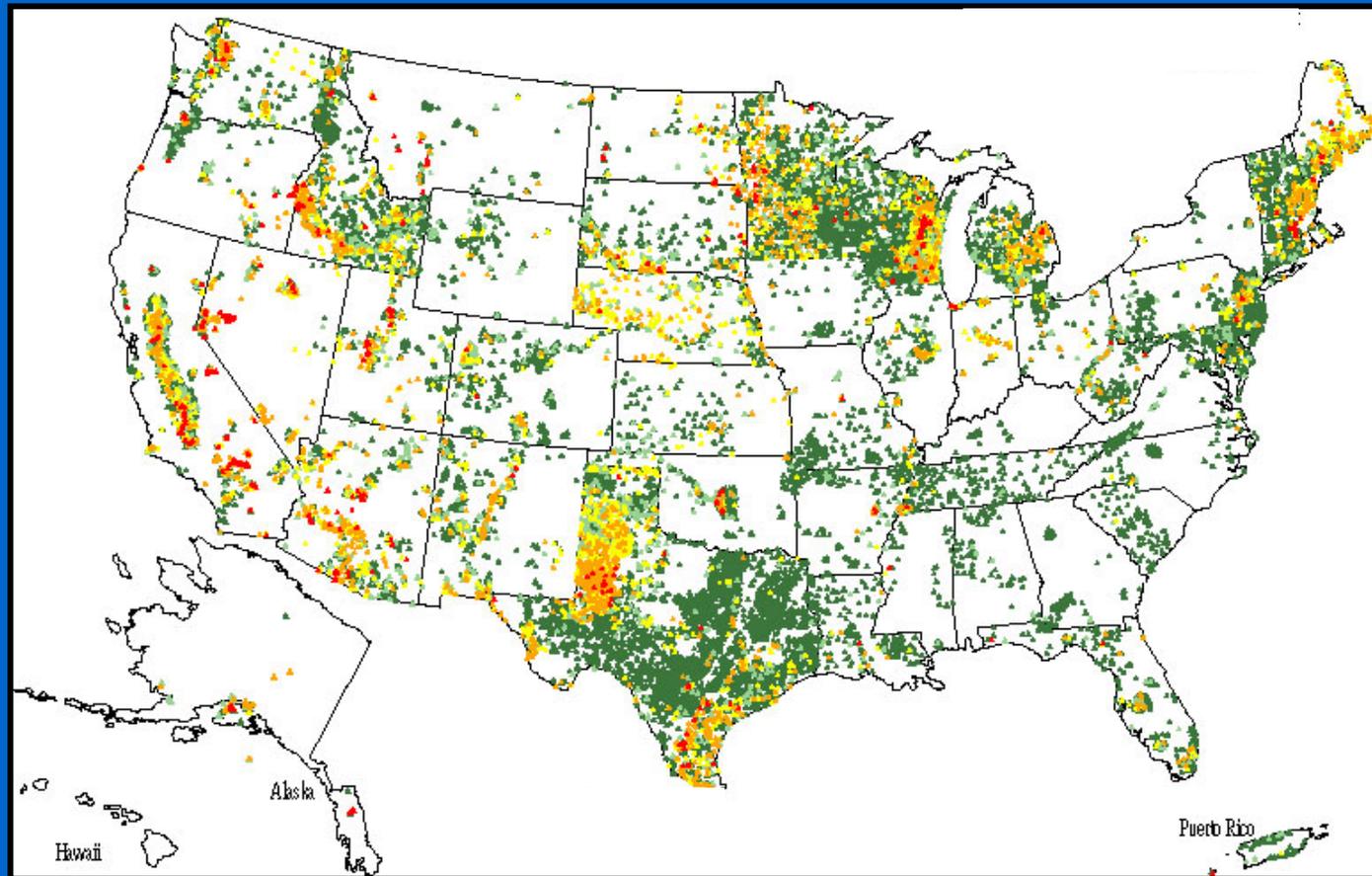
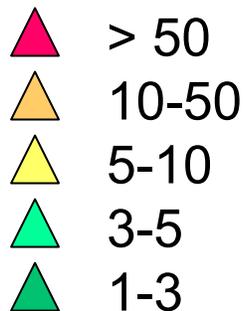
# Arsenic in Ground Water: Mining the USGS NWIS Database

<i>Percentile</i>	<i>50<sup>th</sup></i>	<i>75<sup>th</sup></i>	<i>90<sup>th</sup></i>
Public Supply Wells	1 ug/L	3 ug/L	8 ug/L
All Other Wells	1 ug/L	4 ug/L	13 ug/L

## Well Summary

USGS 20,000  
States 10,000  
Total 30,000

## Conc. $\mu\text{g/L}$



# **Arsenic in Groundwater in Eastern New England: Occurrence, Controls, and Human Health Implications**

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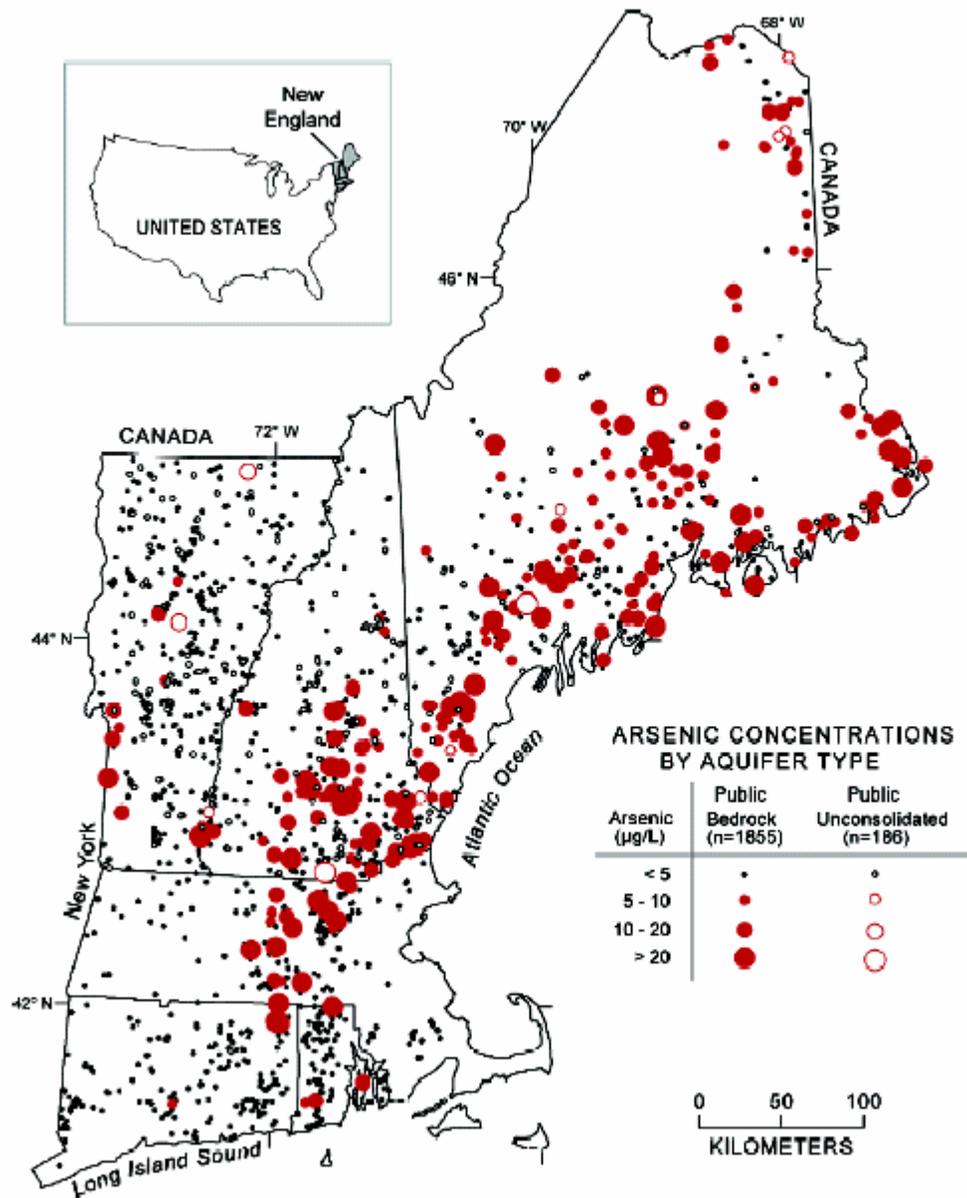


FIGURE 1. Arsenic concentration in source waters to public-supply wells in New England.

# Water Contaminants Studied and in USGS National or Local Occurrence Databases

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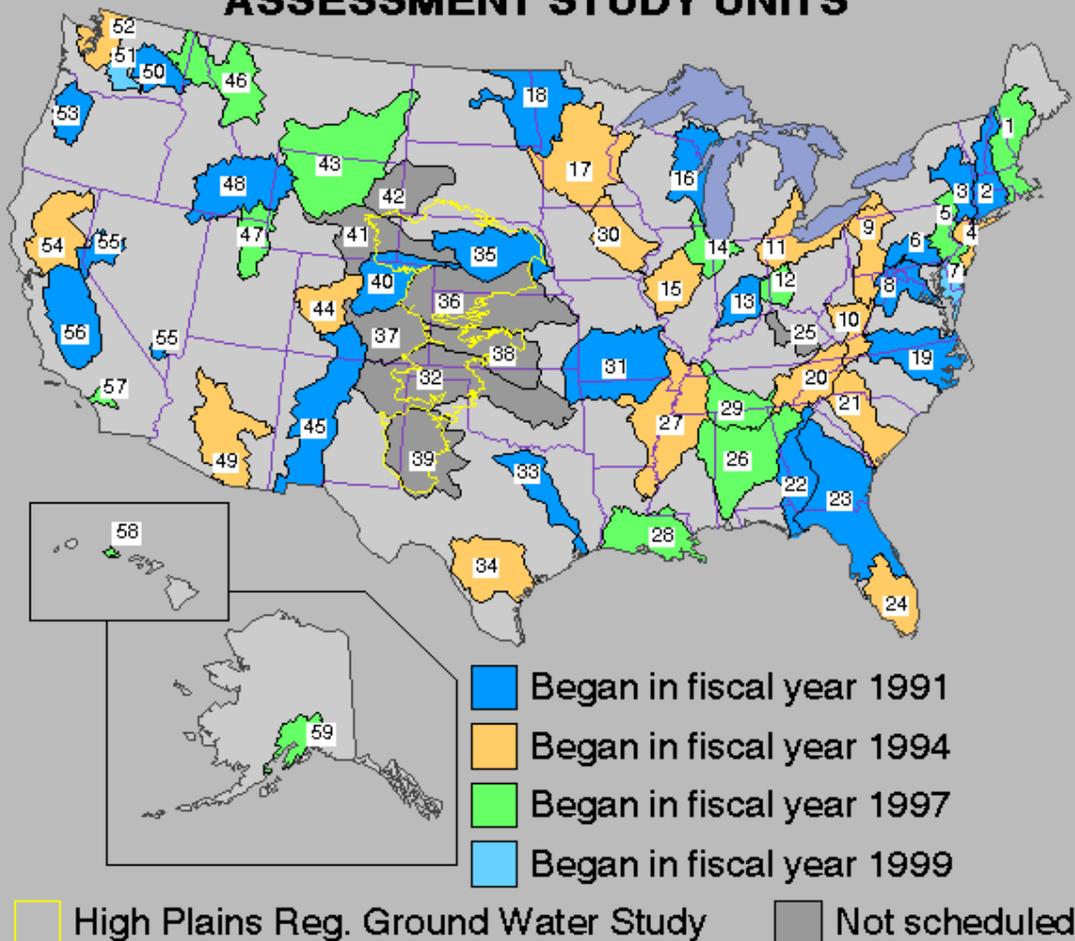
- Nutrients
- Pesticides
- Metals
- Volatile Organics
- Radionuclides
- DBP's and Precursors
- Microbes
- Endocrine Disruptors
- Pharmaceuticals



# Water Quality Assessment

Explaining water-quality conditions in relation to human activities

## LOCATIONS OF NATIONAL WATER-QUALITY ASSESSMENT STUDY UNITS



## National Water Quality Assessment (NAWQA) Program

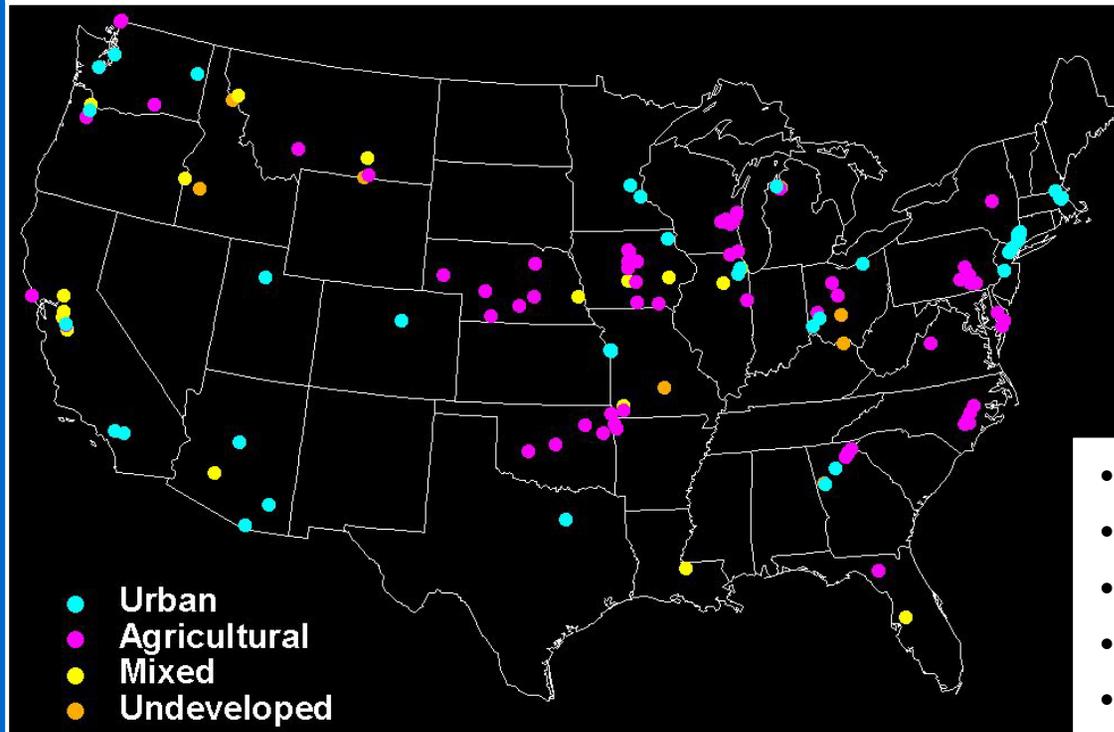
- > 50 major river basins and aquifers.
- Nationally consistent methods and database.
- Regional and National synthesis.

<http://water.usgs.gov/nawqa>

# Water Quality Research: Evaluating new issues & developing new methods and capabilities.

<http://toxics.usgs.gov/>

Pharmaceutically and hormonally active  
compounds in streams.



## Toxic Substances Hydrology (Toxics) Program

- Developing new analytical methods for water samples.
- Evaluating if these compounds enter streams across the Nation.
- Information is used to improve future monitoring and assessment activities.

- Antibiotics
- Human Drugs
- Veterinary Drugs
- Hormones
- Detergents
- Plastics
- Antioxidants
- Fire retardants
- Disinfectants
- Fumigants
- Fragrances
- Insecticides/  
Repellants

# USGS Data Available

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- National Water Information System (NWIS) is available, <http://water.usgs.gov/nwis/>
- For all types of data: surface water flow, ground water levels, water quality there are 1.5 million sites
- For water quality data:
  - 325,000+ sites
  - 4.1 million sampling events
  - 65.4 million water-quality measurements